



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P2**

**NOVEMBER 2009**

**MEMORANDUM**

**MARKS: 150**

**TIME: 2½ hours**

**This memorandum consists of 10 pages.**

**SECTION A****QUESTION 1**

- |     |       |   |         |             |
|-----|-------|---|---------|-------------|
| 1.1 | 1.1.1 | C✓✓   |         |             |
|     | 1.1.2 | B✓✓   |         |             |
|     | 1.1.3 | C✓✓   |         |             |
|     | 1.1.4 | C✓✓   |         |             |
|     | 1.1.5 | A✓✓   | (5 x 2) | (10)        |
| 1.2 | 1.2.1 | Scientific theory ✓   |         |             |
|     | 1.2.2 | Eutrophication✓   |         |             |
|     | 1.2.3 | Biodiversity✓   |         |             |
|     | 1.2.4 | Palaeontology ✓   |         |             |
|     | 1.2.5 | Alien/Exotic✓   |         | (5)         |
| 1.3 | 1.3.1 | None✓✓  |         |             |
|     | 1.3.2 | Both A and B✓✓/A and B  |         |             |
|     | 1.3.3 | B only✓✓/B  |         |             |
|     | 1.3.4 | A only✓✓/A  |         |             |
|     | 1.3.5 | Both A and B✓✓/A and B  | (5 x 2) | (10)        |
| 1.4 | 1.4.1 | Domestic use✓   |         | (1)         |
|     | 1.4.2 | 40,5✓ thousand tons✓  |         | (2)         |
|     | 1.4.3 | Between 1996✓ and 1998✓   |         | (2)         |
|     | 1.4.4 | Both✓ show an increase✓ from 1994 to 2004   |         | (2)         |
|     |       |   |         | <b>(7)</b>  |
| 1.5 | 1.5.1 | Permian period✓   |         | (1)         |
|     | 1.5.2 | <ul style="list-style-type: none"> <li>- In the beginning of the Cretaceous period the number of reptile species was large✓</li> <li>- and increased to its maximum✓ towards the middle of the period.</li> <li>- Towards the end of the Cretaceous period the number of reptile species decreased.✓</li> <li>- In the beginning of the Cretaceous period the number of mammal species was very small✓</li> <li>- but towards the end of the Cretaceous period the number of mammal species started to increase✓</li> </ul> | (Any 4) | (4)         |
|     | 1.5.3 | Reptiles✓, birds✓ and mammals✓  |         | (3)         |
|     | 1.5.4 | Birds are more closely related to reptiles✓.They share✓ a immediate/more recent common ancestor✓  |         | (3)         |
|     |       |   |         | <b>(11)</b> |

1.6	1.6.1	30✓arbitrary units	(1)
	1.6.2	(a) In all countries there is an increase in the level of sulphur dioxide from 1995 to 2000. ✓	(1)
		(b) In France there was an increase in the level of sulphur dioxide from 2000 to 2005✓ whereas in all of the other countries there was a decrease from 2000 to 2005✓	(2)
	1.6.3	Japan✓	(1)
	1.6.4	Using renewable sources of energy such as wind and solar energy✓ Implementing programmes to save energy/hybrid cars/improved public transport✓ Improved technology to reduce pollution✓ <b>(Mark first TWO only)</b>	(any 2) (2) <b>(7)</b>
			<b>[50]</b>
<b>TOTAL SECTION A:</b>			<b>[50]</b>

**SECTION B****QUESTION 2**

2.1	2.1.1	Adaptation✓ to eat different food✓ such as small or large seeds/insects	(2)
	2.1.2	During continental drift ✓/islands became physically separated from the mainland The original population become isolated✓ on the island	(2)
	2.1.3	- Allopatric speciation takes place✓ - On each island the finches lived under different environmental conditions✓/ different sources of food - After a period of time each group of finches underwent natural selection✓ - Only those finches that were best adapted to obtain food survived✓ - Continued natural selection results in each island having species that are very different from each other✓/ they differ genotypically and phenotypically - These differences prevented them from interbreeding✓ and became a new species✓	(any 7) (7)
	2.1.4	Environmental conditions/food sources✓ on the mainland are generally the same✓/fewer genetic variations needed to survive, while on the islands the conditions/food sources were different ✓/need greater genetic variation to survive.	(3) <b>(14)</b>

- 2.2      2.2.1      - Variation within species✓  
                          - A large number of offspring is produced✓  
                          - Of the large number of offspring only a small number survive✓/because of competition for resources/survival of the fittest  
                          - Characteristics are inheritable from parent to offspring ✓  
                          - Animal breeders can selectively breed for certain characteristics✓  
                          **(Mark first FOUR only)** (any 4) (4)

## 2.2.2

Lamarck	Darwin
1. The acquired✓ characteristic/s is/are passed on to the next generation.	1. Inherent✓/ Inborn characteristics can be inherited from parents (natural selection)
2. Organisms have an internal drive to change/deterministic✓	2. Organisms do not have an internal drive to change✓/nature selects the best to survive
3. Individuals change✓	3. Populations change✓
<b>(Mark first TWO only)</b>	any 2 x 2 + 1 table (5)

- 2.3      2.3.1      They have the same✓ index fossils✓ (2)
- 2.3.2      5 ✓and 12 ✓ (2)
- 2.3.3      Radiometric dating✓/ Relative dating (1)
- 2.3.4      - Conditions for fossilisation to take place were not always favourable✓  
                          - All fossils NOT found yet✓  
                          - All organisms are not fossilised✓/eaten by predators/decay by microorganisms  
                          **(Mark first TWO only)** (2)

(7)  
[30]

### QUESTION 3

- |     |       |  |                   |
|-----|-------|--|-------------------|
| 3.1 | 3.1.1 | Equal number✓ of light and dark-banded snails✓ will be eaten in the grassland✓   |                   |
|     |       | <b>OR</b>  |                   |
|     |       | More✓/less light-banded/dark-banded snails✓ will be eaten in the grassland✓  | (3)               |
|     | 3.1.2 | Natural selection ✓/camouflage/predation   | (1)               |
|     | 3.1.3 | Light-banded✓  | (1)               |
|     | 3.1.4 | Lower number of light-banded shells✓ found, indicating that they are not easily detected ✓ by the birds  | (2)               |
|     | 3.1.5 | Started with equal numbers of light and dark-banded snails in the environment✓   | (1)<br><b>(8)</b> |
| 3.2 | 3.2.1 | <ul style="list-style-type: none"> <li>- Whales evolved from a four-limbed terrestrial ancestor✓</li> <li>- Some earlier form of whales became aquatic</li> <li>- Whales with smaller hind limbs could swim well ✓</li> <li>- and escape predators and find food in deeper water and further in the ocean✓</li> <li>- Those with larger hind limbs did not swim well✓</li> <li>- Through natural selection, more whales with smaller hind limbs survived✓</li> <li>- than those with larger hind limbs ✓</li> <li>- Over many generations whales with smaller and smaller hind limbs survived✓in greater numbers</li> <li>- and gave rise to modern whales which have vestigial hind limbs✓</li> </ul> | (any 5)<br>(5)    |
|     | 3.2.2 | The genes are still present in the organism✓(for the vestigial hind limbs) but not expressed in the phenotype. ✓   | (2)<br><b>(7)</b> |

## 3.3 3.3.1 Aluminium

$$95\,000 - 10\,000 = 85\,000 \checkmark \quad \text{OR} \quad \frac{85\,000 \times 100}{95\,000} \checkmark$$

$$= 89,47\% \checkmark \text{ (accept 89\%)}$$

Paper

$$7\,000 - 3\,000 = 4\,000 \checkmark \quad \text{OR} \quad \frac{4\,000 \times 100}{7\,000} \checkmark$$

$$= 57,14\% \checkmark \text{ (accept 57\%)}$$

Aluminium  $\checkmark$  saves the greater percentage of energy (5)

- 3.3.2 Less land  $\checkmark$  for rubbish dumps  $\checkmark$  (landfill sites)  
 Reduction  $\checkmark$  of pollution of land  $\checkmark$   
 Slow down  $\checkmark$  the rate at which humans exploit natural resources  $\checkmark$   
 (trees for wood and paper/tin/glass/metal) (6)  
**(11)**

## 3.4 Biodegradable

Pollutants that microorganisms/bacteria and fungi can break down  $\checkmark$  e.g. any organic wastes  $\checkmark$ /faeces/vegetable matter, etc.

Non-biodegradable

Pollutants that cannot be broken down by microorganisms  $\checkmark$  for example glass  $\checkmark$ /plastic, etc. (4)**[30]****TOTAL SECTION B: 60**

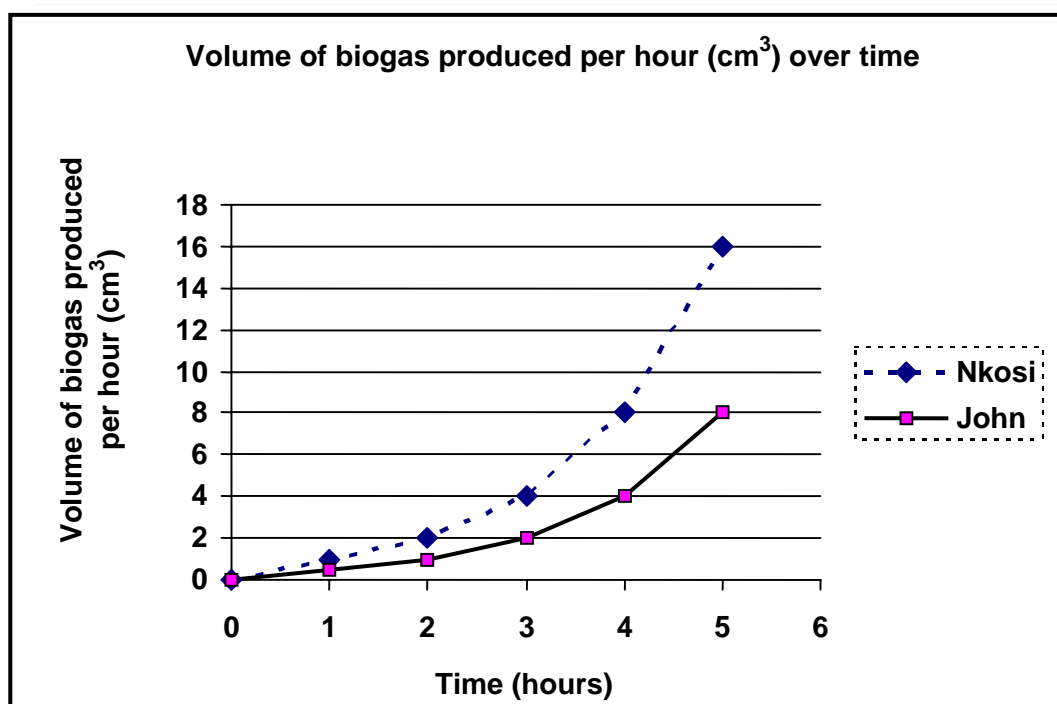
**SECTION C****QUESTION 4**

4.1 4.1.1 Volume of gas produced✓ (1)

4.1.2 32✓ cm<sup>3</sup>✓ (2)

4.1.3 Ensure that water content is the same in chicken manure and dried compost✓  
Repeat the investigation and find averages✓  
Investigation must be carried out jointly by John and Nkosi✓  
Nkosi and John must each do both experiments✓  
**(Mark first TWO only)** (2)

4.1.4



**Rubric for the mark allocation of the graph**

Correct type of graph	1
Title of graph	1
Correct label for X-axis including <b>unit</b>	1
Graphs labelled/key provided for 2 graphs	1
Correct label for Y-axis including <b>unit</b>	1
Appropriate scale for X-axis	1
Appropriate scale for Y-axis	1
Drawing of graphs	1 – 1 to 2 points plotted correctly 2 – 3 to 5 points plotted correctly 3 – 6 to 9 points plotted correctly 4 – all 10 points plotted correctly
All points joined for graph A	1
All points joined for graph B	1

**NOTE:**

If the wrong type of graph is drawn:

- Marks will be lost for "correct type of graph"
- Marks will be lost for joining of points

If graphs are not drawn on the same system of axes:

- Mark the first graph only using the given criteria

If axes are transposed:

- Marks will be lost for labelling of X-axis and Y-axis

(13)

**(18)**

4.2      4.2.1      Lives in shallow water✓and does not need expensive fishing equipment✓ to harvest (2)

- 4.2.2
- Limit✓ the number caught
  - Only licensed✓ fishermen may catch perlemoen
  - Heavy penalties✓/fines for those who contravene regulations
  - Stipulate minimum size✓ of perlemoen that can be caught to minimise the impact on the population
  - Patrol all those beaches✓ where perlemoen is found to ensure compliance with regulations
  - Education✓

- Introduce strict legislation✓

**(Mark first TWO only)**

(any 2) (2)



- 4.2.3 If the number of perlemoen is reduced:  
 Food/algae numbers will increase✓ because less is eaten by perlemoen.  
 The organisms that eat the perlemoen will decrease in numbers✓  
 The organisms that rely on these will also decrease in number✓  
 The energy flow through the habitat will be reduced✓ (any 3) (3)  
**(7)**

4.3 Possible answer

**Management strategies to improve the quality of water**

- Legislation✓ and monitoring of emissions from industries✓
- Provide adequate sewage systems✓ so that people do not urinate or pass faeces near a source of water✓
- Provide clean containers to collect water ✓so that pollutants do not contaminate the water✓
- Educate people✓ on the importance of caring for our environment✓
- Reduce the use of pesticides ✓so that less run off to our rivers ✓
- Provide purified✓/safe water to everyone✓

**(Mark first FOUR only)** (8)

**Sources of water pollution**

- Sewage✓
- Waste from factories✓
- Dumping of rubbish/waste✓
- Soap and chemicals entering the water✓

**(Mark first TWO only)** (2)

**Effects on human physiology and health**

- Gastroënteritis✓
- Cancer✓
- Typhoid✓
- Allergies✓
- Cholera✓

**(Mark first TWO only)**

**Content (12)**

**ASSESSING THE PRESENTATION OF THE ESSAY**

<b>Marks</b>	<b>Description</b>
<b>3</b>	Well structured – demonstrates insight and understanding of question
<b>2</b>	Minor gaps in the logic and flow of the answer
<b>1</b>	Attempted but with significant gaps in the logic and flow of the answer
<b>0</b>	Not attempted/nothing written other than question number

**Synthesis** (3)  
**(15)**  
**[40]**

**GRAND TOTAL: 150**